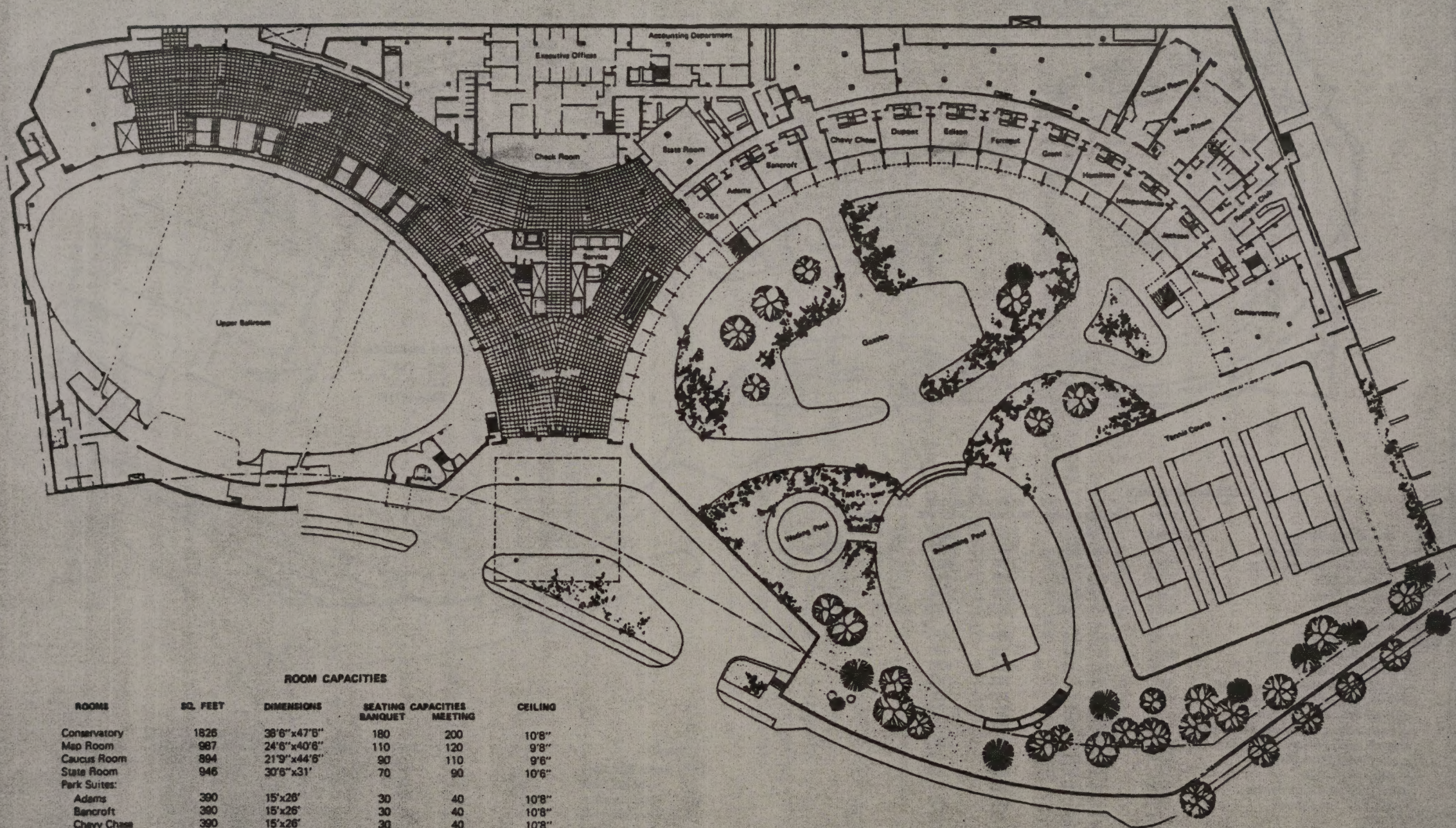


THE WASHINGTON HILTON PLANNING SHEET

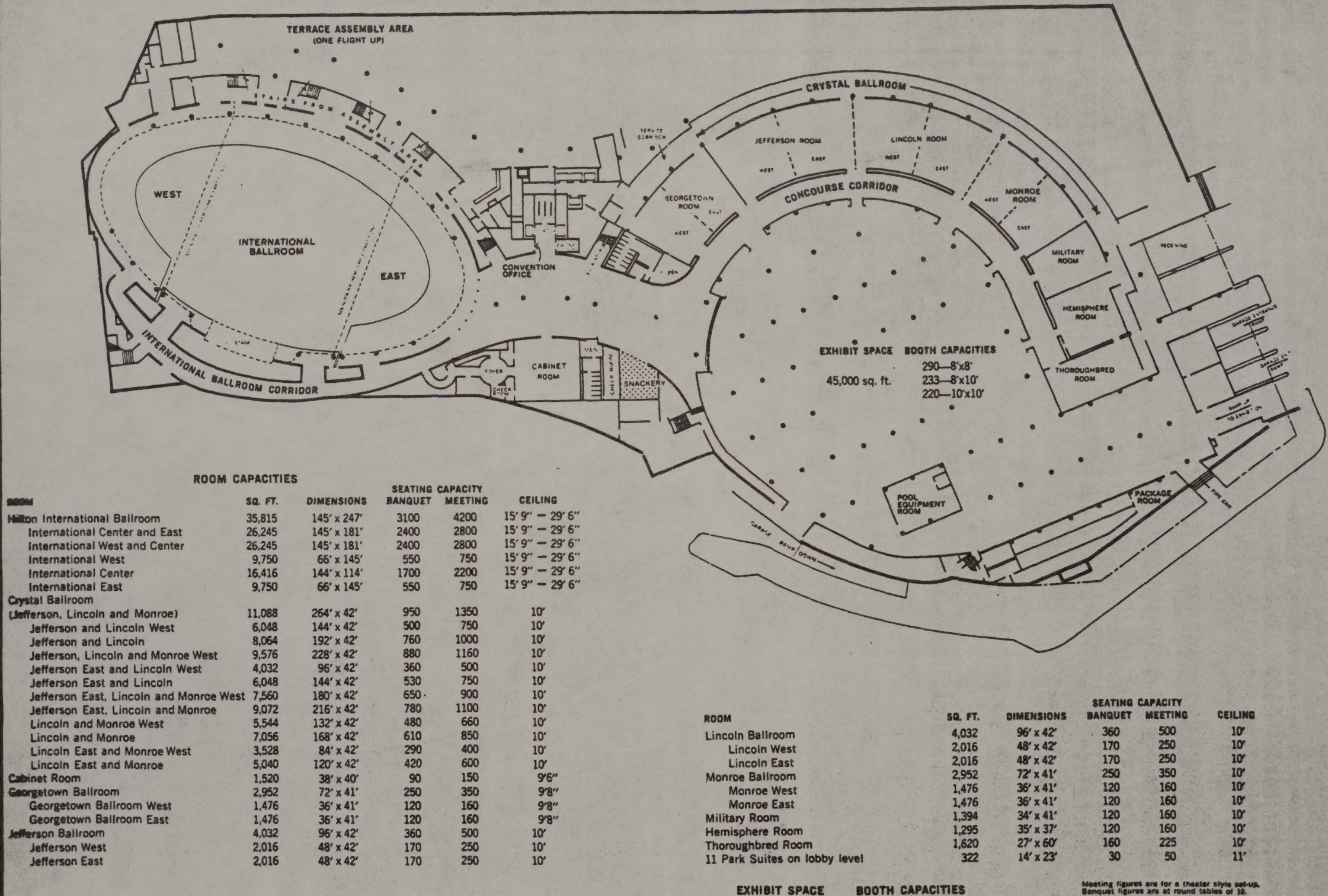


ROOM CAPACITIES

ROOMS	SQ. FEET	DIMENSIONS	SEATING CAPACITIES		CEILING
			BANQUET	MEETING	
Conservatory	1826	38'6" x 47'8"	180	200	10'8"
Map Room	987	24'6" x 40'8"	110	120	9'8"
Caucus Room	894	21'9" x 44'6"	90	110	9'6"
State Room	946	30'6" x 31'	70	90	10'6"
Park Suites:					
Adams	390	15'x28'	30	40	10'8"
Bancroft	390	15'x26'	30	40	10'8"
Chevy Chase	390	15'x26'	30	40	10'8"
Dupont	390	15'x26'	30	40	10'8"
Edison	390	15'x26'	30	40	10'8"
Farragut	390	15'x26'	30	40	10'8"
Grant	390	15'x26'	30	40	10'8"
Hamilton	390	15'x26'	30	40	10'8"
Independence	390	15'x26'	30	40	10'8"
Jackson	390	15'x26'	30	40	10'8"
Kalorama	390	15'x26'	30	40	10'8"

Terrace Level

THE WASHINGTON HILTON AND *Towers* PLANNING SHEET



Concourse Level

Agricultural Research Service
National Research Leader Meeting
Itinerary
For

C. J. WHITTEN

Research Leader

Screwworm Research Laboratory

P. O. Box 3149

Laredo, TX 78041

FTS: 0115296133550

COMM: 0115296133550

Telemail Address: LC.TUXTLA

Location Code and Description:

4050-05-00 INTERNATIONAL ACTIVITIES
 TUXTLA GUTIERREZ, MEXICO
 SCREWWORM RESEARCH

Workshops:

Tuesday: Animal Production
Location: Edison Room, Terrace Level
Leader: Hudson A. Glimp
Title: RL, Range Sheep Prod Efficiency

Wednesday: Infectious Diseases of Animals: Priority by Species
Location: Jackson Room, Terrace Level
Leader: Gary Colgrove
Title: NPL, Animal Health

Thursday: Internal and External Parasites of Animals
Location: Edison Room, Terrace Level
Leader: Ralph A. Bram
Title: NPL, Medical & Vet Ent & Parasit

TO ALL PARTICIPANTS:

The following information is important for you to know:

1. There will be a registration table at the Hotel on the Front Terrace, starting at 3:00 p.m.

Washington Hilton & Towers, Front Terrace
1919 Connecticut Avenue, N.W.
Washington, D.C. 20009

Telephone # (202) 483-3000

2. Upon registration, please inquire at the registration table about the location of the message board where messages can be placed by you or others who may wish to contact you.

3. Should you become ill, the two nearest hospitals are:

Washington Hospital Center
110 Irving Street, N.W.
Washington, D.C. 20010-2975

Main # (202) 877-7000
Emergency # (202) 877-6701

Georgetown University Hospital
3800 Reservoir Road, N.W.
Washington, D.C. 20007-2194

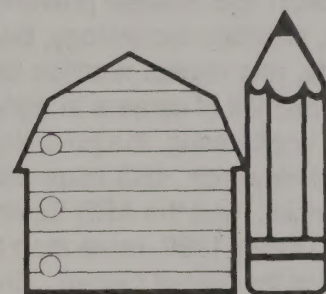
Main # (202) 687-5055
Emergency # (202) 784-2118

Thank you for your cooperation.

Ag in the Classroom

Notes

United States
Department of
Agriculture



A bi-monthly newsletter for the Agriculture in the Classroom program. Sponsored by the U.S. Dept. of Agriculture to help students understand the important role of agriculture in the United States economy. For information, contact: Shirley Traxler, Director, Room 317-A, Administration Bldg., USDA, Washington, D.C. 20250-2200. 202/447-5727

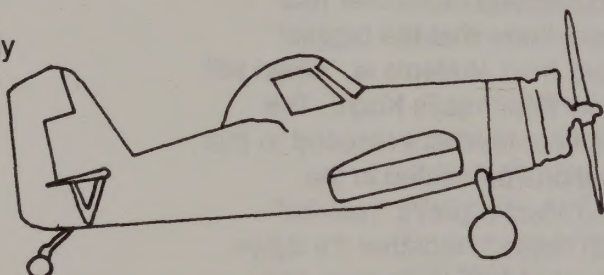
Jan./Feb. 1990

Vol. 5, No. 8

New Materials Take Students Up, Up and Away

"Kids are fascinated by airplanes," says Ruthanne Koch of the Women of the National Agricultural Aviation Association (WNAAA). "Introducing agriculture by talking about airplanes is a guaranteed way to arouse their interest."

With Cindy Schreiber-Beck, chair of the WNAAA Education

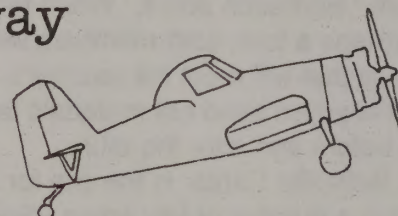


Committee, Koch has developed curriculum guides that use the subject of agricultural aviation as an introduction to the study of agriculture in the classroom. Koch serves as chair of the

WNAAA Public Relations Committee.

WNAAA offers two curriculum guides, one geared for elementary students and one including activities for junior/senior highs. The theme of

continued on page 7



A Front Door to Agricultural Science

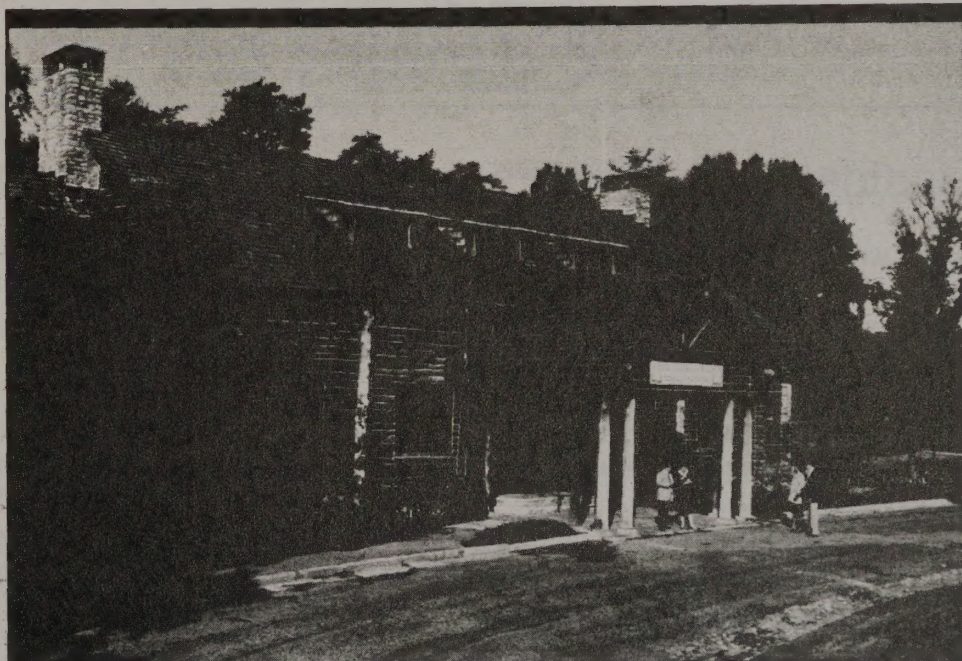
A historic building on the grounds of the Beltsville Agricultural Research Center today offers teachers and students a look at the research that is shaping the future. Opened in 1989, the ARS National Visitor Center provides a close-up look at the work of USDA research scientists.

The Visitor Center, housed in the Log Lodge, is a new educational experience on the international importance of food and agricultural sciences. The Log Lodge was originally built from blueprints of lodges for Yellowstone National Park by the depression-era Civilian Conservation Corps.

The outside of the building may be a reminder of the past, but inside the Log Lodge are displays featuring state-of-the-art research on the likely future of the food and fiber

continued on page 7

Historic Log Lodge now
houses the new ARS
National Visitor Center.



Agricultural Science

Continued from page 1

industries. Visitors to the center learn about plant breeding and biotechnology, animal nutrition and disease prevention, soil conservation, irrigation technology, biological control of pests, and human nutrition studies. Other exhibits tell of careers in agricultural science and engineering, the products and inventions of such research, ARS interaction with regulatory agencies, and the ARS Science Hall of Fame.

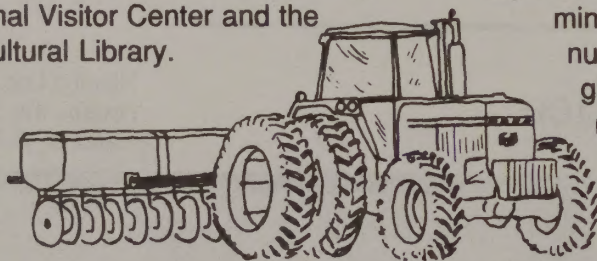
During 1989, more than 25,000 people toured the Visitor Center. Steve Berberich, Director of the Center, says visitors include scientists, business people, foreign travelers, and members of the general public. But the most frequent visitors by far are teachers and students.

"We want teachers to view tours of the Visitor Center as a regular part of their curriculum," Berberich notes. When teachers call to arrange a tour, staff members will help tailor a visit that will meet the teacher's specific needs. They also send out materials teachers can use before and after the tour.

The Beltsville Center is the site for scientific research in a number of key areas. Scientists who are studying nutrition, medicine, hydrology, and the greenhouse effect are all close at hand.

"Teachers are always surprised by the breadth and scope of agricultural research they see here," Berberich reports. "In fact," he adds, "amazed" is the word we keep hearing."

Those who attend the national AITC conference will have the pleasure of touring both the National Visitor Center and the National Agricultural Library.



Up, Up and Away

Continued from page 1

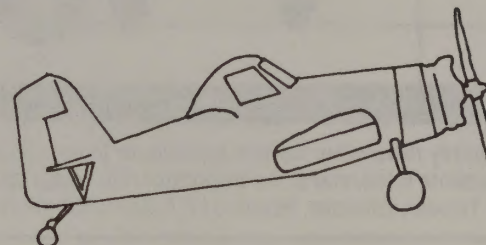
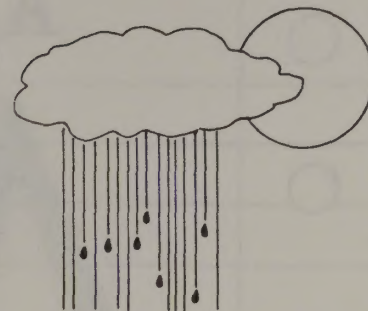
both guides is "Agricultural Aviation: Critical Assist for the World's Food Supply."

Both guides offer students a brief look at the history of agricultural aviation. Specialized activities allow teachers to integrate the subject of agricultural aviation in subjects ranging from language arts to physics and from social studies to earth science.

Both guides include a number of reproducible activity sheets, as well as a suggested list of additional activities that teachers can use. Guides were reviewed by educators and by agricultural aviators before publication to make sure materials were both accurate and appropriate for classroom use.

The guides are also designed to help develop a positive image of the agricultural aviation industry. "We reviewed textbooks before we began writing the materials," Koch notes. "In most textbooks, there is no mention made of agricultural aviation. But when it is mentioned, it is usually in a negative context."

Activities also respond to another real concern. "Teachers know that the biggest complaint they hear from students is, 'When will I ever need to know this?'" says Koch. The WNAAA materials help teachers respond to that question. All situations presented in the curriculum guides reflect a pilot's "real-life" experiences, Koch notes. "Whether it's determining the cost of fuel or planning the number of acres that can be sprayed in a given amount of time, we've tried to make our materials reflect the problems we face every day."



Mississippi: New Farm and Food Bytes

Working with the Mississippi Cooperative Extension Service, the Mississippi AITC program has developed a Mississippi section of the Farm and Food Bytes computer program. The program, says Mississippi state contact Helen Jenkins, "has proved to be an exciting way to learn about agriculture with emphasis on our own state."

Through the cooperation of Farm Bureau Insurance Companies, each county Farm Bureau in the state has received a copy of the computer program. At the state's leadership

conference last spring, computers were set up in the meeting areas and leaders had a chance to get some real "hands-on" experience working with the program.

One copy of the program was distributed to a school in each of the state's 100 counties. Counties and school districts are placing orders for additional programs. The Cooperative Extension Service, for example, has ordered several copies of the program for use by 4-H Clubs.

USDA COMPLETES FIRST ARS VISITOR CENTER EXHIBITS

USDA has recently completed the first exhibits of its ARS National Visitor Center, an educational facility located in Prince Georges County, Maryland. The new center is housed in the historic Beltsville Log Lodge, which was built in 1937.

Inside the lodge are displays of subjects ranging from plant breeding and biotechnology to the products and inventions of agricultural engineering. Also included is a scientific hall of fame.

Tours of the center are available for visiting scientists, business persons, foreign visitors, government officials, educators and the general public. They can be arranged by calling (301) 344-2483.

The center staff is interested in hearing from the scientific community about ideas for new exhibits, especially ARS-cooperative projects with universities and industry. The proposed exhibits should demonstrate how science is solving a food or agricultural problem. Ideas should be sent to Stephen Berberich, director of the National Visitor Center, at Building 302, Beltsville, Md. 20705 or telephone (301) 344-2720.

4/10/90

~~Plot~~ MARY CARTER → Do not mistake the edge of the rut for the horizon —
Plowman

+ — ARS Program Plan
— " Implementation Plan

475^{IN} attendance
350 RL's

FY-91
\$600 million
122 LOC (40mil increase)
2600 SY
9-10K employee

- ① Make best choice (can't do everything)
- ② How can we get and keep good people
- ③ Improve interest in science in schools
- ④ Who will be our client
- ⑤ Be more aggressive in assuming leadership in national problems

Predictions

1. importance INCREASING
2. more consumer-oriented
3. fuse is shorter
4. deal with perception
5. Product development more important (utilization)
6. more production research
7. " sustainable agric.

↖ Holtzman (Nabset Group) 4/10/90

- change is certain
- education, training & sophistication of work force is criteria
- distribution of production
- Japanese jump at opportunity
- widening investment gap between 1st & 3rd world count.
- environmental issues no longer single issues but considered as a whole problem
- food production must increase by 50% by 2025
- drinking water quality
- ARS must go beyond science
 - to regulation changes
 - to environmental changes
-

(202)
797-4800
message
phone

4/10/90

Phillips (OTA)

Future Science Policy

- too much basic research that is NON-AGRIC. ORIENTED?
- little incentive for PRIVATE RESEARCH?

Functions in order of priority

- ① Mission - goal(s) & protocol to reach goal
- ② Planning - integrating interagency programs
- ③ Priority -
- ④ Structure
- ⑤ Funding

Frealey (Monsanto)

Industry viewpoint

Reasons for public ambivalence

1. Excess (grain & oil)
2. Health & safety concerns
3. Changing farm infrastructure
4. Conflicts in farming & science
5. Anti-technology sentiments

4/10/90

Fraily cont

2 mo. to isolate a gene
(Monsanto budgeting assumption)

10 yrs to sequence every gene
in a plant

in 7 yrs, Monsanto has
produced 35,000 transgenic
plants (dicots)

"shooting" DNA material in
monocots

—
co-protein production in a
plant serves as an
immunization^{to} the virus
associated with the co-protein
= resistance to viral diseases

one gene
control
is easier

Offutt (OMBA)

4/11/90

Future Role of Federal Sector in Agric. Sector

Motto: It's not our money
but it's not yours either

National Research Initiative

creativity

Philosophy

- Size of return

- Distribution of return

- if major recipient is taxpayer
then taxpayer should fund res.

improvement in quality may be
more important than quantity

Funds for

- Basic

- Research that gov't must do

Food safety etc

(satisfying
gov't needs)

- Applied

Water quality

(Environmental
problems)

- View SEA as a whole

ARS is a part of this

4/11/90

Knutson

EXTERNAL INFLUENCE ON AGRIC

- MARKET ECONOMY - largely a TRADE FORCE
- ENVIRONMENT & Food SAFETY - a CONSUMER FORCE

- SCIENCE

PERCEPTION

(Problem -
Lack of effective
planning

CORN is barometer
of U.S. agriculture

[Increased scientific interaction
on a global basis

4/11/90

Secretary Yetter

Goals

- reduce reliance on taxpayer
- increase income of farmers
- National & Global interaction -
- Specific initiatives
 - Biotechnology
 - Cost of production
 - Environmental protection
 - Non-food uses
 - Health & nutrition
 - Food safety
- Other points
 - Dissemination of information to lay public
 - ~~Education~~ Competitiveness

ZACHARIAS

4/12/90

Effective Leadership

- create value

ACTION - RESULTS

PERSUASION - example

- challenge the process

- ability to envision the future
(inspire)

- enable others to act

- model the behavior you want others
to follow

- encourage working together

Reference

- The Leadership Challenge
(1987)

- Gardner

Reed

4/12/90

- Leading a Multicultural
Work Force

344 3151

344 1520

INTERNAL & EXTERNAL PARASITES 4/12/90

- Ecology
 - Nutrition
 - Genetics
 - Attractants
- No. AFRICA
Provide res. support to APNIS
sw eradication
in all aspects
- Loop w/ College Sta
w/ Fargo
w/ Kerrville

Kerrville - Biting Flies & Cattle Brub
Immunology

Beltsville - Livestock Insects

Dairy cattle & poultry

Kerrville - Tick biology, genetics,
physiology, pop. dynamics

Bainesville - Mosquito & Fly

Bio control (mosquito pathogens
muscoïd parasites)

Attractants & Repellents

IPM of Flies

Ames - Respiratory Diseases of Ruminant
(Cutlip)

Ames - Swine venology - Pseudonabies
(Menzel) eradication
by 2000

Lincoln - Increase productivity of
confined livestock

Beltsville - Biosystematics of internal para-
(Lichtenfels) DNA-probe technology sites

Beltsville - Cattle, sheep, swine helminths
(Urban) (immunology)

Beltsville - Toxoplasma
(Fayer)

4/12/90

Beltsville - Protozoan Diseases
(Ruff) Coccidiosis

Auburn - Animal Parasites (Internal)
(Klesius) Aquaculture immunology

Gainesville - Modeling & Simulation
(Mount)

" - Molecular Biology & Genetics
(Seawright) of Mosquitoes
(Transposable
Genes)
(Germ line transformation)
Silicon carbide "whiskers"
Attractants (mammalian
attractants to
mosquitoes)

Gainesville - Imported Fire Ant, Cockroach
(Patterson) (allergies)
(Technology Transfer
Agreements)

College Station - Vet & Med Ento Res Lab

Bull - Biopeptides

- Resistance

- Biocontrol

3
Int & Ext Parasites

4/12/90

- Models
 - Deterministic vs Stochastic ★
- Physiology
 - Long term, high risk research
 - Neuropeptides
 - 5-12 aa residues
 - Very unstable
 - Bioassay kits to detect resistance
immunoassay/DNA technique
- Immunology
 - accepted by general public
 - has a genetic base
- Biocontrol
- Molecular Biology
 - be flexible

cytokines

Sheep & Goats

4/11/90

① Abontion
(Beltsville)

(Ames)

② Bluetongue (Laramie)
vector genetics, competence,
a biology.

③ Pneumonia (Ames)
(Clay Ctr)

④ Scrapie (Pullman)
(Ames)

⑤ Other

Gene insertion into

Food producing animals
(Ames)

Metabolic & Infectious diseases

Resistance: effects of
endocrine & nutrition (Ames)

Wildlife - farm animal
(Big Horn) ↓ interaction
(sheep)

Infectious Diseases

4/11/90

Bany Colnoug -

What is not covered

Different ways to approach

Cattle

Swine - (ie reproductive
metabolic etc.)
systems approach ?
or disease approach ?

(vaccination control system)
African swine fever

Broad approaches across "species
(categories)"

- Basic immunization
- Gene expression -
- Delivery

For
immunology
research
Use
Transgenic
mice
as model
system?

Poultry

Respiratory disease in Turkeys

(Host genetics may give different
response to vaccine)

ARS National Research Leaders' Conference

*Washington, D.C.
April 10 - 13, 1990*

*Opportunities and Challenges
in Agricultural Research for the
Early 21st Century*

*Agricultural Research Service
United States Department of Agriculture*

Dear Participant

in the first National Research Leaders' meeting,

The organizing committees welcome you to the first national meeting of ARS Research Leaders. As we approach the 21st century, the signs are clear that consumers, farmers, ranchers, and the agricultural industry will experience great change. Maintaining an adequate, safe, high-quality, economically-competitive supply of food and fiber will require research. The objective of this meeting is to develop a vision of future opportunities and challenges in agricultural research. We have assembled speakers and workshops to set the climate for the meeting, but achievement of the objective depends on your expertise and insight.

If you are accompanied by members of your family, they may obtain assistance in planning sightseeing trips at the TS and R Tour desk on the Terrace Level of the hotel.

We have arranged for Drew-Dawn Associates to assist us with the conference. Renee Morris and other staff members of DDE will be at the ARS service desk to help you during the conference.

We wish you all a successful conference and a pleasant stay in Washington.

Sincerely,

Donald. D. Bills
General Chairman

Dora K. Hayes
Arrangements Chair

Johnie N. Jenkins
Program Chairman

Program

Monday Evening April 9, 1990

3 p.m. - 9 p.m

**Registration
Front Terrace**

7 p.m. - 9 p.m.

**Informal Reception
Georgetown Room**

Tuesday, April 10, 1990

Visualizing and Guiding the Future of Agriculture and ARS

International Ballroom East

Moderator **Mary E. Carter**
Associate Administrator, ARS

8:00 a.m. **Mission and Vision for the
Agricultural Research Service**
Speaker: R. D. Plowman
Administrator, ARS

8:50 a.m. **Toward 2021: Trends, Pathways
and Pitfalls**
Speaker: Jody Holtzman
Sr. Associate, The Naisbet Group,
Washington, D.C.

9:40 a.m. **Break**

Moderator **Floyd P. Horn, Director**
Southern Plains Area

10:10 a.m. **Future Science Policy**
Speaker: Michael J. Phillips
Office of Technology Assessment
Washington, D.C.

10:40 a.m. **The Future of Agriculture:
Viewpoint from Industry**
Speaker: Robert T. Fraley
Director, Plant Science Technology
Monsanto Agricultural Company

11:10 a.m. **Orientation for
Breakout Sessions**
Edward B. Knipling, Jr.
Deputy Administrator, NPS

Johnie Jenkins
Director and Research Leader
Crop Science Research Laboratory
Mississippi State

Tuesday Program - continued

11:30 a.m. Adjourn for Lunch

1:00 p.m. Concurrent RL Workshops

Workshop

- 1 **Human Nutrition as a Basis for
Improving Food**
Leader: Gary Beecher
Adams Room
- 2 **Novel Uses for Agricultural
Commodities**
Leader: William Doane
Bancroft Room
- 3 **Assuring A Safe Food Supply**
Leader: Glen Ivie
Chevy Chase Room
- 4 **Maintaining Quality and Reducing
Losses of Agricultural Commodities**
Leader: Alley Watada
Conservatory Room
- 5 **Animal Health and Pest Control**
Leader: John R. Gorham
Monroe East Room
- 6 **Animal Production**
Leader: Hudson Glimp
Edison Room
- 7 **Engineering Technology:
Agricultural Commodities and
Products**
Leader: Louis Bouse
Farragut Room
- 8 **Future Strategies for Preserving
and Enhancing Plant Germplasm**
Leader: Steve Eberhart
Grant Room
- 9 **Range, Pasture, Forage, and
Livestock Systems**
Leader: Phillip Sims
Hamilton Room

Tuesday Program- continued

Workshop

- | | |
|---------------------|---|
| 10 | Modifying Germplasm Through
Breeding and Biotechnology
Leader: Charles Stuber
State Room |
| 11 | Plant Physiology, Biochemistry,
and Production
Leader: William Ogren
Independence Room |
| 12 | Protecting Plants From Pests
Leader: R. J. Cook
Hemisphere Room |
| 13 | Protecting Plants from
Environmental Stress
Leader: Jerry Quisenberry
Monroe West Room |
| 14 | Future Strategies for Protecting
and Managing Natural Resources
Leader: Bobby Stewart
Jackson Room |
| 15 | Global Climate Change and
Agriculture
Leader: Wilburt Blackburn
Kalorama Room |
| 50 | Administrative Management
Conference
Leader: T. J. Clark
International Ballroom East |
| 5:00 p.m. | Adjourn for Dinner |
| 5:15 -
6:15 p.m. | Information Discussion and Review
Georgetown Room |

Wednesday, April 11, 1990

Understanding the Influences of Economics and Society on Agriculture and Agricultural Research

International Ballroom East

Moderator **Herbert L. Rothbart, Director
North Central Area**

**8:00 a.m. External Influences on Agriculture:
Societal, Environmental and
Global Economy**
Speaker: Ron Knutson
Department of Agricultural Economics
Texas A&M University

8:45 a.m. USDA in the Future
Introduction of Speaker:
R. D. Plowman
Speaker: Honorable Clayton Yeutter
Secretary of Agriculture

9:45 a.m. Break

Moderator **K. D. Murrell, Director
Midwest Area**

**10:15 a.m. A New Paradigm for Agriculture:
Demand Enhancement as an
Alternative to Supply Control**
Speaker: Edward Runge
Head of Agronomy Department
Texas A&M University

**11:00 a.m. Future Role of the Federal Sector
in Agricultural Research**
Speaker: Susan Offutt
Office of Management and Budget
Washington, D.C.

11:45 a.m. Adjourn for Lunch

Wednesday Program - continued

1:00 p.m. Concurrent NPL Workshops

Workshop

- | | |
|-----------|--|
| 16 | New Crops and Industrial Crops:
Priorities
Leader: Philip Miller
Bancroft Room |
| 17 | National Coordination of Models
and Databases
Leader: Stephen Rawlins
State Room |
| 18 | Increasing Infiltration and Rooting
Depth
Leader: Doral Kemper
Thoroughbred Room |
| 19 | Germplasm Repositories & GRIN
Database
Leader: Henry Shands
Chevy Chase Room |
| 20 | Improving Value Added Traits in
Small Grains
Leader: Charles Murphy
Edison Room |
| 21 | Horticultural/Low Acreage Crops:
Prospects for Change
Leader: Howard Brooks
Military Room |
| 22 | Molecular Entomology and Insect
Genetics: Program Development
Leader: Robert Faust
Map Room |
| 24 | Systems Approach to Animal
Production
Leader: Lewis Smith
Hemisphere Room |
| 25 | Food Safety: Natural and
Microbial Toxins
Leader: Jane Robens
Cabinet Room |

Wednesday Program - continued

Workshop

- 26 Commodity Treatments:
Challenges and Opportunities**
Leader: Milton Ouye
Farragut Room
- 27 Fiber and Polymeric Materials
Research**
Leader: Frank Werber
Grant Room
- 28 Weed Management: Program
Adjustments for the 1990's**
Leader: Lawrence Christy
Caucus Room
- 30 Human Nutrition: Diet and Risk
Factors**
Leader: Gerald Combs
Hamilton Room
- 31 Alfalfa/Forage Research: Prospects
and Program Adjustments**
Leader: James Elgin, Jr.
Independence Room
- 38 Biological Control: Development
of a Strategic Plan**
Leader: Richard Soper
Conservatory Room
- 39 Infectious Diseases of Animals:
Priority by Species**
Leader: Gary Colgrove
Jackson Room
- 51 Mid-Year ARMP**
Leader: R. D. Plowman
Adams Room

5:00 p.m. Adjourn for Dinner

5:15 - Informal Discussion and Review
6:15 p.m. Georgetown Room

Thursday, April 12, 1990

Recruiting and Leading ARS's Future Workforce

International Ballroom East

Moderator Essex E. Finney, Jr., Director,
Beltsville Area

8:00 a.m. **Effective Leadership for the Future**
Speaker: Donald Zacharias
President of
Mississippi State University

8:45 a.m. **Leading a Multicultural Workforce**
Speaker: Cecil Reed
Merriam, Kansas

9:30 a.m. **Break**

Moderator T. J. Clark
Deputy Administrator
Administrative Management

10:00 a.m. **Demonstration Projects**
Leader: Jane Giles, Director
Personnel Division

12:00 p.m. **Adjourn for Lunch**

1:30 p.m. **Concurrent NPL Workshops**

Workshop

23 **Animal Germplasm and Genome
Mapping**
Leader: Roger Gerrits
Bancroft Room

29 **Animal Care: Research
Alternatives and Guidelines**
Leader: Helene Guttman
Chevy Chase Room

Thursday Program - continued

Workshop

- 33 Commercialization of Research:
Development and Implementation**
Leader: Ruxton Villet
Thoroughbred Room
- 34 Hydrology and Water Resources:
Imperatives for the Nineties**
Leader: David Farrell
Caucus Room
- 35 Soil Microbiology and Nutrition
Management**
Leader: James Parr
Cabinet Room
- 36 Plant Health: Priorities by Pathogen**
Leader: Edwin Civerolo
Map Room
- 37 Applied Entomology: Issues and
Priorities**
Leader: James Coppedge
Hemisphere Room
- 40 Internal and External Parasites
of Animals**
Leader: Ralph Bram
Edison Room
- 41 Strategic Plan for Range Research**
Leader: Dennis Child
Farragut Room
- 42 Plant Patent Policies: Impact on
Breeding Programs**
Leader: Howard Brooks
Military Room
- 43 Grain Quality: Attributes and
Response to Change**
Leader: Wilda Martinez
Grant Room

Thursday Program - continued

Workshop

**45 Sensor Technology: Priorities for
Implementation**
Leader: Ralph Nave
State Room

**46 Biosafety and Facilities for
Infectious Diseases**
Leader: Manuel Barbeito
Hamilton Room

**47 Plant Genome Research: Plans
and Expectations**
Leader: Jerome Miksche
Conservatory Room

52 Mid-Year ARMP
Leader: R. D. Plowman
Adams Room

5:30 p.m. Adjourn for Dinner

**6:00 - Informal Discussions
7:00 p.m. Crystal Ballroom**

**7:00 p.m. Banquet
Crystal Ballroom**

**Agricultural Science and Education
in the Early 21st Century**
Speaker: Charles E. Hess
Assistant Secretary of Agriculture for
Science and Education

Friday Morning

April 13, 1990

International Ballroom East

Moderator Edward B. Knipling, Jr.

8:00 a.m. RL Workshop Reports

10:00 a.m. Break

10:30 a.m. NPS Workshop Reports

11:30 a.m. Closing Remarks:
Reflections and Charge for the
Future
Speaker: R. D. Plowman

12:00 p.m. Adjourn

Committees

Steering Committee

Mary E. Carter

T. J. Clark

Edward B. Knipling, Jr.

Herbert Rothbart

General Chairman/Coordinator

Donald Bills

Arrangements Committee

Dora Hayes, Chair

Jackie Bishop

Marc Cathey

Darrell Cole

Robert Norton

Loretta Owens

Sherlie West

Program Committee

Johnie Jenkins, Chair

Rodney Bothast

Howard Brooks

Jane Giles

Harley Moon

Clarence Richardson

The Outstanding Support of the Following Persons is Gratefully Acknowledged:

Nancy Atherholt

Don Christenson

Linda Fulton

Sandy Henry

Wendy Jacobs

Clarence Keen

Lynda Markley

Claudia Volz

Debra Wilhelm

Notes

4/11/90 Ralph & DENNIS @ 5 pm
Sid & Frank @ 3 pm
4/12/ Bill Phillips @ 10 pm



DENNIS
7207



United States
Department of
Agriculture

Agricultural
Research
Service

National
Program
Staff

Beltsville, Maryland
20705

March 22, 1990

SUBJECT: NRLM - Workshop No. 39, "Infectious Diseases of Animals:
Priority by Species"

TO: Participants, Workshop No. 39

FROM: Gary S. Colgrove, NPL *Gary S. Colgrove*
Animal Health

Enclosed is the outline for the subject workshop which will be held on
Wednesday, April 11.

I am looking forward to your participation in this workshop and the
opportunity to meet you.

Enclosure

List of Participants:

H. W. Ross	National Animal Disease Center, Ames, IA
M. F. Cheville	National Animal Disease Center, Ames, IA
V. L. Nispling	National Animal Disease Center, Ames, IA
R. C. Cutlip	National Animal Disease Center, Ames, IA
J. M. Miller	National Animal Disease Center, Ames, IA
R. L. Hovak	National Animal Disease Center, Ames, IA
K. B. Shaden	National Animal Disease Center, Ames, IA
R. B. Brock	Plum Island Animal Disease Center, Greenvale, NY
T. M. Moore	Plum Island Animal Disease Center, Greenvale, NY
D. Pack	Plum Island Animal Disease Center, Greenvale, NY
M. V. Langford	Plum Island Animal Disease Center, Greenvale, NY
C. W. Ward	Southwest Faculty Research Laboratory, Athens, GA
R. L. Witter	National Faculty Research Laboratory, Fock Landing, MD
T. E. Wilson	Arthropod-borne Animal Diseases Research Lab., Ithaca, NY
J. R. Gorton	Animal Disease Research Unit, Pullman, WA
R. H. Miller	Wild Secretion and Multiple Laboratory, Beltsville, MD
E. T. Littlejohn	U.S. Meat Animal Research Center, Clay Center, NE
T. J. Sartin	Livestock & Poultry Sci. Inst., Beltsville, MD
J. K. Lightfoot	Myxomatous Parasitology Lab., Beltsville, MD
J. F. Urban	Helminthic Diseases Lab., Beltsville, MD
G. B. Thomas	Livestock Insects Research, Lincoln, NE
J. E. George	Fish Research, Knoxville, TN
G. J. Carmichael	Latfish Genetics Research Unit, Stoneville, MS
F. H. Klever	Animal Parasite Research Unit, Auburn, AL
C. J. Wilson	Schwartz Research Laboratory, Hialeah, FL
A. Jordan	National Program Staff, Beltsville, MD

National Research Leaders Meeting
WORKSHOP NO. 39

Title: Infectious Diseases of Animals: Priority by Species

Background Statement: ARS must be responsive to changing animal health issues. The "priority diseases" of the 1980's need to be re-examined in terms of their continuing impact on animal productivity; as progress is made in the diagnosis, prevention, and control of these diseases, at least some redirection of research priorities is inevitable. This workshop will examine research directions in the 1990's.

Objectives:

- (1) To assign priorities to infectious diseases of each species, based on economic impact on the national level.
- (2) To identify problems (i.e., deficiencies in knowledge or technologies) associated with each disease.
- (3) To define approaches to solving these problems.

Expected Product: Identify and develop two or three new project areas that ARS should consider for implementation or expansion during the next 5 years. Also, develop a list of areas to be considered for less emphasis during this period of time.

List of Participants:

H. W. Moon	National Animal Disease Center, Ames, IA
N. F. Cheville	National Animal Disease Center, Ames, IA
W. L. Mengeling	National Animal Disease Center, Ames, IA
R. C. Cutlip	National Animal Disease Center, Ames, IA
J. M. Miller	National Animal Disease Center, Ames, IA
R. L. Horst	National Animal Disease Center, Ames, IA
K. R. Rhoades	National Animal Disease Center, Ames, IA
R. G. Breeze	Plum Island Animal Disease Center, Greenport, NY
D. M. Moore	Plum Island Animal Disease Center, Greenport, NY
D. Rock	Plum Island Animal Disease Center, Greenport, NY
W. W. Laegreid	Plum Island Animal Disease Center, Greenport, NY
C. W. Beard	Southeast Poultry Research Laboratory, Athens, GA
R. L. Witter	Regional Poultry Research Laboratory, East Lansing, MI
T. E. Walton	Arthropod-borne Animal Diseases Research Lab., Laramie, WY
J. R. Gorham	Animal Disease Research Unit, Pullman, WA
R. H. Miller	Milk Secretion and Mastitis Laboratory, Beltsville, MD
E. T. Littledike	U.S. Meat Animal Research Center, Clay Center, NE
T. J. Sexton	Livestock & Poultry Sci. Inst., Beltsville, MD
J. R. Lichtenfels	Biosystematic Parasitology Lab., Beltsville, MD
J. F. Urban	Helminthic Diseases Lab., Beltsville, MD
G. D. Thomas	Livestock Insects Research, Lincoln, NE
J. E. George	Tick Research, Kerrville, TX
G. J. Carmichael	Catfish Genetics Research Unit, Stoneville, MS
P. H. Klesius	Animal Parasite Research Unit, Auburn, AL
C. J. Whitten	Screwworm Research Laboratory, Tuxtla Gutierrez, Mexico
A. Jordan	National Program Staff, Beltsville, MD

Detailed Agenda:

General Statement: Discussion leaders will provide a brief overview of current research priorities for his or her species, then lead the participants in (1) prioritizing diseases for the 1990's and (2) identifying problems and approaches for each disease.

Chair: G. S. Colgrove

Other Participating NPL's: M. S. Barbeito (Back-Up)

List of Proposed Speakers:

Objectives of Workshop	G. S. Colgrove	1:00 - 1:15
Diseases of Cattle	J. M. Miller	1:15 - 2:00
Diseases of Swine	W. L. Mengeling	2:00 - 2:45
Diseases of Poultry	C. W. Beard	3:15 - 4:00
Diseases of Sheep and Goats	R. C. Cutlip	4:00 - 4:45
Summary and Wrap-up	G. S. Colgrove	4:45 - 5:00

April 1990

National Research Leaders Meeting
WORKSHOP NO. 40

Title: Internal and External Parasites of Animals

Background Statement: As we enter the '90's, new technologies are becoming available that, when applied in appropriate ways, could have a major impact in accelerating research progress. Although ARS research programs dealing with internal parasites (helminths and protozoa) and external parasites (arthropods) take advantage of many of these new opportunities, there may be possibilities for expanding their application even more. As an example, five specific areas may have broader application: (1) immunology; (2) fundamental physiology; (3) modeling and simulation; (4) biological control; and (5) molecular biology.

Objectives:.

- (1) To inventory the current scientific direction of research on the management of internal and external parasites of animals with special attention to: host immunology, fundamental parasite physiology, modeling and simulation of parasite population dynamics, biological control, and molecular biology
- (2) To identify scientific areas requiring additional attention and, where possible, identify future priorities
- (3) To provide, through discussions, a rare opportunity for cross-fertilization among Research leaders in Animal Parasitology and Medical & Veterinary Entomology

Expected Product: Two or three high priority technical areas which could be fortified and expanded will be identified by the group. The final product will be packaged proposals for these new initiatives.

List of Participants:

J. R. Lichtenfels, Beltsville, MD	D. L. Bull, College Station, TX
J. F. Urban, Beltsville, MD	S. E. Kunz, Kerrville, TX
M. D. Ruff, Beltsville, MD	F. S. Guillot, Kerrville, TX
R. Fayer, Beltsville, MD	J. E. George, Kerrville, TX
J. R. Gorham, Pullman, WA	G. A. Mount, Gainesville, FL
P. H. Klesius, Auburn, AL	R. S. Patterson, Gainesville, FL
D. K. Hayes, Beltsville, MD	D. R. Barnard, Gainesville, FL
G. D. Thomas, Lincoln, NE	J. A. Seawright, Gainesville, FL
C. J. Whitten, Tuxtla Gutierrez, Mex	W. L. Mengeling, Ames, IA
J. R. DeLoach, College Station, TX	R. C. Cutlip, Ames, IA
P. D. Jackson, College Station, TX	G. J. Carmichael, Stoneville, MS
D. Domingo, Beltsville, MD	C. E. Skeens, Stoneville, MS

Detailed Agenda:

General Statement: The workshop format will be based on a brief general overview presentation of new technologies followed by comments and discussion. Through the leadership of the Chairman, 2 or 3 prioritized proposal packages will be developed.

Chair: R. A. Bram

Other Participating NPL's: G. Colgrove

List of Proposed Speakers:

1:00-2:00 p.m.	Overview of Research Units	Research Leaders
1:00-3:00 p.m.	Discussion of New Technologies	
	Host Immunology	J. Urban
	Fundamental Physiology	D. Bull
	Modeling and Simulation	G. Thomas
	Biological Control	R. Patterson
	Molecular Biology	M. Ruff
3:00-3:30 p.m.	Break	
3:30-5:00 p.m.	Develop Proposals for Enhanced Initiatives	R. Bram

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J. R. DeLoach, College Station, TX	R. C. Cutlip, Ames, IA
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	Molecular Biology	M. Ruff
3:00-3:30 p.m.	Break	
3:30-5:00 p.m.	Develop Proposals for Enhanced Initiatives	R. Bram

April 1990

INFECTIOUS DISEASES OF CATTLE, ARS 1990

BACTERIA**Brucellosis**

335,095 Pathogenesis
 594,102 Immunogens
 313,787 Immune mechanisms
413,872 Diagnostic methods

1,656,856

Salmonellosis

295,865 Transmission

Paratuberculosis

649,035 Diagnostic tests

Leptospirosis

686,845 Pathogenesis, molecular biology

PROTOZOA**Anaplasmosis**

499,038 Vaccine

Piroplasmosis (bovine and equine)

278,502 Diagnosis, vaccine

VIRUSES**Rift Valley Fever**

644,414 Vaccine

BVD

542,398 Pathogenesis, diagnosis, vaccine

Lentivirus

299,521 Diagnosis, pathogenesis

Herpesviruses

332,827 Molecular biology

Decreases
 ↓

Mastitis
(3 CRIS)

Reproductive (herpes)

454,308 Pathogenesis, vaccine

Scrapie (BSE) (Crazy cow syndrome)

251,100 Pathogenesis (cattle)

RESPIRATORY DISEASE

641,879 Pathogenesis

647,213 Pathogenesis, vaccine

416,138 Epidemiology

344,604 Nutrition, stress, and immunity

2,049,834

DISEASE RESISTANCE

512,135 Gene insertion (disease resistance)

550,472 Endocrines and nutrition

MISCELLANEOUS

648,885 Immunology of calf diseases

1,246,654 Diagnosis and control of African diseases

PARASITES

Ticks

531,434 Chemical control, epidemiology

128,208 Biological control

Nematodes

268,080 Identification and classification

165,939 Genetic resistance

303,562 Immunobiology

210,110 Pathogenesis, resistance

190,580 Epidemiology, management

Flies and grubs

354,981 Resistance, immunity

609,119 Biology, control

229,412 Biology, control

318,242 Biological control

Lyme Disease?

A New Paradigm for Agriculture: Demand Enhancement as an Alternative to Supply Control

Prepared by E.C.A. Runge¹

National Research Leaders' Meeting
Opportunities and Challenges in Agricultural Research
for the Early 21st Century
Washington Hilton
1919 Connecticut Avenue, N.W.
11 April 1990

¹ E.C.A. Runge is Professor and Head of the Department of Soil and Crop Sciences, Texas A&M University, College Station, Texas 77843-2474, (409)845-3041. The contributions, interaction, and assistance of J.B. Penson, S.H. Murdock and D.I. Padberg in preparing this document is gratefully acknowledged -- All are professors at Texas A&M. Penson is Stiles Professor of Finance in Agr. Economics; Murdock is Head of Rural Sociology; and Padberg is Head of Agr. Economics.

**A NEW PARADIGM FOR AGRICULTURE:
DEMAND ENHANCEMENT AS AN ALTERNATIVE TO SUPPLY CONTROL**

Overview:

1. The U.S. supplies about 40% of the wheat and 60% of the coarse grain traded on World markets. Consequently, U.S. policy affects all grain imports and exports.
2. With the current ability to overproduce grain, there is need to prevent stagnation in U.S. and World agriculture.
3. Everyone wants to minimize government intervention in agriculture. Would demand enhancement help in achieving this goal?
4. Demand enhancement costs would have to replace, not add, to supply control costs to be a feasible alternative.
5. The value of increasing the production of renewable energy supplies is recognized. Would demand enhancement facilitate changes needed?
6. It is necessary to retain market orientation and improve competitiveness. How would an equilibrium or 'sink' price be determined?
7. Any policy change must be feasible politically.

A NEW PARADIGM FOR AGRICULTURE: DEMAND ENHANCEMENT AS AN ALTERNATIVE TO SUPPLY CONTROL

Introduction/Goals:

1. The United States and World needs to strive for an agricultural policy that supports the development of an agriculture enabled by science that is also in harmony with environmental and human values.
2. U.S. agriculture must be as competitive as possible and have policies that enable U.S. and World agriculture to move in the direction of meeting long term need(s). Agricultural policy should be relevant to the present, position us for the future and be politically possible.
3. U.S. agriculture must strive to be competitive. Exports and trade must be encouraged. If government intervention policies are required, emphasis must be directed to achieve positive ends, including:
 - a) Stabilizing farm production
 - b) Conserving natural resources
 - c) Maintaining payrolls in rural areas
 - d) Developing energy alternatives
 - e) Encouraging economic development in third world countries
4. U.S. agricultural policy should reward, and be recognized as rewarding, productivity rather than non-productivity. It should foster the development of technology and creativity to increase the supply of the World's goods and services while creating conditions that allow agricultural producers to remain in business and rural America to foster an improved quality of life for its residents.

*supply
control policies
are difficult
because you cannot
accurately predict
weather*

**A NEW PARADIGM FOR AGRICULTURE:
DEMAND ENHANCEMENT AS AN ALTERNATIVE TO SUPPLY CONTROL**

Issues Affecting U.S. Agriculture:

1. Excess crop production capacity - Dennis Avery, World Perspectives, Inc. Washington, D.C. estimates that the world has 150 million metric tons of excess crop production capacity with 2/3's of that located in the United States.
2. Variable climate has always been a risk assumed by farmers dependent on rainfed agriculture. If meteorological predictions are correct, future weather will be more variable than the weather we have experienced in the recent past. If that is the case, it will become increasingly hazardous to predict annual production of our major crop commodities.
3. Rural areas must have an increase in employment if their economic conditions are to improve. If U.S. agriculture could operate at its sustainable rate it would help maintain and perhaps create additional jobs in rural areas. This in turn would help maintain the human resource base and the infra-structure of rural areas.
4. U.S. farmers will only be competitive if we develop and they apply the latest technology available. Restriction of output will suppress the discovery and use of Biotechnology as well as other forms of technology.
5. Food, Fiber and Water Quality - American citizens are much more concerned about the quality of their food and fiber supply than at any other time in history. Water quality is a major concern and any major agricultural production practice will have to pass increasingly stringent environmental tests.
6. Budget Deficit - The budget deficit limits options that can be considered. For any proposal to be considered, it must not increase negative impact on the budget.
7. Many countries still demand imports and will continue to do so, however, many nations are also becoming self-sufficient. Crop production has increased in many countries that were formerly importers of U.S. commodities.

A NEW PARADIGM FOR AGRICULTURE: DEMAND ENHANCEMENT AS AN ALTERNATIVE TO SUPPLY CONTROL

Considerations:

1. Food and Fiber Supply - Food and fiber production has historically exceeded demand and has provided substantial surpluses for emergency situations -- droughts, etc. This excess could be used as a subsidized "sink" to produce energy or other products.
2. The capital investment in the "sink" is less than that needed to adjust production. The cost of bringing "sink" capacity on line and shutting it down would be less than the cost of controlling supply. Dislocation of rural resources would be much less.
3. If you can't predict climate, you cannot predict yield and supply. Under demand enhancement climatic variability and its influence on crop production would be minimized since agriculture would produce at its sustainable level.
4. With agriculture operating at its sustainable level, the number of agriculturally-related jobs in rural areas would be maximized and stabilized.
5. Applicable technology from biotechnology and other research and development activities could be effectively utilized to increase the production and efficiency of agriculture.
6. Budget expenditures would be less and be more concentrated in rural areas within the U.S. than with present programs (EEP, ARP, CRP, etc). Agricultural subsidies would be allocated to operating the "sink" to produce energy products and providing rural jobs rather than disposing of excess capacity on the world market or paying farmers not to produce.
7. World Trade - It should be possible for countries to cooperate on a demand enhancement policy. Establishment of reserve supplies for food emergencies would be necessary before operating the "sink".
8. A limited number of crops would need to be designated as "sinks". The ethanol industry is able to use starch. Corn and wheat are grown over wide areas of the US and could be designated as the unregulated acreage crops for use in a "sink".
9. Farmers are aware that the amount of carry-over or ending stocks substantially affect prices. Any use of a crop commodity as a "sink" for excess crop production would have to ensure growers that the price was based on the cost of production. Non-sink crops would be subject to normal supply/demand activity, price fluctuations, etc.
10. CO₂ Problem - Demand enhancement policies using designated crop commodities as "sinks" for excess production would maximize the amount of CO₂ taken up by plants and recycled.

A NEW PARADIGM FOR AGRICULTURE: DEMAND ENHANCEMENT AS AN ALTERNATIVE TO SUPPLY CONTROL

Some questions needing evaluation:

1. What are the full range of costs and potential benefits from a demand enhancement program and how would such costs and benefits be distributed relative to existing programs?
2. How rapidly could such a policy be implemented and how long would it be before its impacts would become evident?
3. What are the best "sinks" to use in implementing such a policy and what are the relative costs and benefits associated with different sinks?
4. What would be the substitution effects among "sink" and "nonsink" commodities?
5. How substantial would the secondary and tertiary effects be of such a policy and in what regions of the Nation would they be concentrated -- such as the effects on the retention of producers and populations in rural areas, the impacts on jobs in rural areas, the effects on the infrastructure and tax base of rural areas, the net cost to the US taxpayer, etc.?
6. How would producers, commodity, environmental, and other interest groups, as well as the public respond to such a policy?
7. What effects would such a policy have on the domestic petroleum industry and other U.S. and foreign industries?

References

- Runge, E.C.A., J.B. Penson, S.H. Murdock, D.I. Padberg and B.A. Stout. Demand Enhancement as a Sink for Excess Crop Production. In press, *Journal of Production Agriculture*, April-June 1990.
- Penson, J.B. and J.W. Richardson. Implications for Agronomists Under Demand Enhancement Policies. In press, *Journal of Production Agriculture*, April-June 1990.
- Tweeten, Luther. Implications for Agronomists Under Present Voluntary Supply Management Policies. In press, *Journal of Production Agriculture*, April-June 1990.
- Murdock, S.H., D.E. Albrecht and R.R. Hamm. Agricultural Policy, Agronomy and Rural Development. In press, *Journal of Production Agriculture*, April-June 1990.

A NEW PARADIGM FOR AGRICULTURE: DEMAND ENHANCEMENT AS AN ALTERNATIVE TO SUPPLY CONTROL

6

Implications of Supply Control and Demand Enhancement *

*EtBe
(Butane + EtOH)
used in gasoline
(does not
absorb H₂O)*

Supply Control Policies	Demand Enhancement Policies
<u>Implications for Crop Producers</u>	
■ Higher commodity prices	■ Higher commodity prices
■ Lower stocks	■ Lower stocks
■ Extend life of existing machinery	■ Shorter life of existing machinery
■ More intensive use of yield enhancing inputs per acre	■ Greater use of new technologies and purchase additional resources
■ Fewer total purchased inputs	
<u>Implications for Livestock Producers</u>	
■ Higher feed prices	■ Higher feed prices
■ Feed supplies more vulnerable to weather shocks	■ Feed supplies less vulnerable to weather shocks
<u>Implications for Domestic Consumers</u>	
■ Higher food prices	■ Higher food prices
■ Food supplies more vulnerable to weather shocks	■ Food supplies less vulnerable to weather shocks
<u>Implications for Foreign Trade</u>	
■ Higher world prices	■ Higher world prices
■ Lower exports	■ Higher exports under export enhancement
	■ Lower exports under domestic enhancement
<u>Implications for Input Supply Manufacturers</u>	
■ Reduced demand for machinery and equipment	■ Expanded demand for machinery and equipment
■ Reduced demand for chemicals, fertilizer and seed	■ Increased demand for chemicals, fertilizer and seed
<u>Implications for Environment</u>	
■ Reduced use of marginal lands	■ Greater use of marginal lands
■ Less groundwater pollution and fewer chemical residues	■ (More groundwater pollution and greater chemical residues) *
<u>Implications for Rural Communities</u>	
■ Reduced sales by agri-business firms	■ Expanded sales by agri-business firms
■ Lower hired labor force in agriculture and agri-business	■ Increased hired labor force in agriculture and agri-business
■ Reduced rural economic activity and tax base	■ Expanded rural economic activity and tax base
<u>Implications for Government</u>	
■ Higher U.S. Treasury costs	■ Lower U.S. Treasury costs
■ Lower economic activity in food and fiber sector leads to lower GNP and tax revenue and higher budget deficits	■ Greater economic activity in food and fiber sector leads to higher GNP and tax revenue and lower budget deficits
■ Increase risk of slippage due to biotechnologies	

* From Penston, J.B. and J.W. Richardson. Implications for Agronomists Under Demand Enhancement Policies. Given at American Society of Agronomy Meeting, Anaheim, California, November 30, 1988. To be published in the Journal of Production Agriculture, April-June 1990.

SUPPLY & UTILIZATION OF WHEAT (FROM AGRICULTURAL OUTLOOK)^{1/}

	-----Acres-----						Feed
	Set Aside	Plant ed	Har- vested	Yield	Produc- tion	Ending stocks	Farm price
	<u>Mil. acres</u>			<u>Bu/acre</u>			<u>\$/bu</u>
Wheat							
1984/85	18.3	79.2	66.9	38.8	2,595	1,425	3.39
1985/86	18.8	75.6	64.7	37.5	2,425	1,905	3.08
1986/87	21.0	72.1	60.7	34.4	2,092	1,821	2.42
1987/88	23.9	65.8	56.0	37.7	2,107	1,261	2.57
1988/89	22.5	65.5	53.2	34.1	1,811	698	3.72
1989/90	9.7	76.6	62.1	32.9	2,042	443	3.85-4.00

^{1/} Source: Agricultural Outlook, December, 1989, US Department of Agriculture

SUPPLY & UTILIZATION OF CORN (FROM AGRICULTURAL OUTLOOK)^{1/}

	-----Acres-----						Feed
	Set Aside	Plant ed	Har- vested	Yield	Produc- tion	Ending stocks	Farm price
	<u>Mil. acres</u>			<u>Bu/acre</u>			<u>\$/bu</u>
CORN							
1982/83	2.1	81.9	72.7	113.2	8,235	3,523	2.55
1983/84	32.2	60.2	51.5	81.1	4,175	1,006	3.21
1984/85	3.9	80.5	71.9	106.7	7,674	1,648	2.63
1985/86	5.4	83.4	75.2	118.0	8,877	4,040	2.23
1986/87	14.3	76.7	69.2	119.3	8,250	4,882	1.50
1987/88	23.0	65.7	59.2	119.4	7,072	4,259	1.94
1988/89	20.5	67.6	58.2	84.6	4,921	1,930	2.54
1989/90	10.2	72.3	65.1	116.6	7,590	1,898	2.00-2.40

^{1/} Source: Agricultural Outlook, December, 1989, US Department of Agriculture

ANIMAL REPRODUCTION

Constraints, Opportunities, and Research Priorities

(Purpose: Increase number of offspring/female/year)

1. Control of ovulation.

A. Time and number of ovulations.

(1) Overcoming seasonal breeding or egg laying.

a. Genetic selection.

b. Hormone treatments or management changes.

(2) Synchronization methods.

(3) Superovulation.

B. Follicle development and atresia.

C. Endocrine, neuroendocrine, paracrine, and autocrine controls.

2. Embryo manipulation.

A. Oocyte collection methods.

B. In vitro fertilization methods.

C. Embryo culture, storage and transfer.

D. Embryo cloning - blastomeres, stem cells.

E. Genome alteration for production traits, disease resistance, modification of meat and milk.

(1) Identification of gene-regulating sequences - promoters, enhancers, suppressors.

(2) Gene transfer methods.

3. Embryo and fetal survival.

A. Embryo-utero-ovarian interrelationships.

(1) Growth factors and chemical signals.

(2) Endocrine and neuroendocrine regulation.

B. Hatchability of poultry eggs.

C. Neonatal survival.

(1) Dystocia

(2) Diseases.

4. Sperm preservation and artificial insemination.

A. Sperm preservation methods.

B. Artificial insemination methods.

(1) Sperm transport and retention in the female.

5. Male fertility.

A. Libido and behavior.

B. Sire selection criteria.

C. Semen evaluation.

6. Control of sex of offspring.

A. X-Y sperm separation.

B. Sexing of embryos.

C. Sexing of unfertilized poultry eggs.

DAIRY CATTLE REPRODUCTION - RESEARCH PRIORITIES

Prospects to 2010

Greatly increased use of embryo transfer.

Increased use of superovulation and regulated ovulation, decreased need for twice-daily estrus detection.

Major use of oocyte collection, in vitro fertilization, and embryo culture, preservation and transfer.

Increasing use of cloned, sexed embryos with genetic potential already evaluated, possibly genome altered.

General Research Problems

1. Oocytes and embryos.

- A. Oocyte collection methods to maximize numbers.
- B. In vitro fertilization and embryo culture systems.
- C. Embryo storage.
- D. Embryo cloning.
 - (1) Blastomere transfer.
 - (2) Stem cell development and transfer.

2. Production of sexed offspring.

- A. X-Y separated sperm.
- B. Sexed embryos.

3. Genome alteration.

- A. Gene regulation sequences and insertion methods.
 - (1) Production traits.
 - (2) Disease resistance.
 - (3) Product modification.

4. Embryo survival.

- A. Embryo-utero-ovarian chemical signals.
 - (1) Embryonic growth factors.
 - (2) Anti-luteolytic agents.
- B. Endocrine and neuroendocrine control mechanisms.

5. Estrus detection.

- A. Implanted sensors and computerized monitoring.

6. Male physiology and sperm preservation.

ANIMAL PRODUCTION

Nutrition

- 1) Goal: Provide required energy and nutrients in appropriate quantities to optimize product output.

Implicit components of this goal:

1. Optimize, to the animal production industry, generally implies maximizing net returns to the enterprise.

- a. Short and long term optimization are not likely to be equivalent e.g., Sustainable Agriculture.
- b. Optimization, or maximization of net returns, is often not equivalent to maximizing product output.

- 2) Product must be identified.

- a. Market specific, e.g., meat vs lean meat vs lean, tender meat vs prime meat.

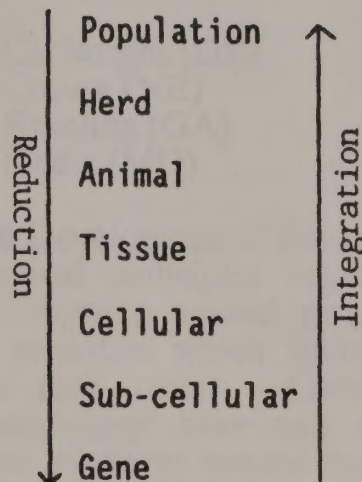
b. Product

- 1. eggs
- 2. milk
- 3. wool, hair
- 4. offspring, i.e., reproduction rate
- 5. meat, i.e., lean growth rate

- 3) Optimization requires knowledge of relationships of product output to nutrient (or other resource) input.

- a. Genetics
- b. Environment
- c. Disease
- d. Parasites

2. Organization hierarchy of nutrition research



- a. Viable research opportunities exist at all levels, as well as those involving animal-food-environment interfaces.
- b. Future advances can be most readily achieved by integration of research efforts and knowledge at several levels in the hierarchy.

3. High priority research areas

- a. Improve understanding of the mechanisms of regulation of metabolism.
- b. Increase knowledge of interrelationships among chemical and physical characteristics of feedstuffs, gastrointestinal tract environment-ecosystems and nutrient absorbed for utilization by the animal.
- c. Identify and quantify interrelationships among genotype, management, nutrient environment, climate and disease.

Animal Production:RL Workshop, Tuesday, April 10, 1990**Growth and Development**

Cartwright (DE)

Crouse (NE)

Kraeling (GA)

Steele (MD)

Background- Growth and Developmental Biology is a hybrid title which infers the application of biological principles regardless of discipline (genetics, nutrition, physiology) to improve animal production efficiency. With this definition, the research priorities which follow are rather diverse and no consensus existed as to rank order. Considering that research efforts collectively termed "biotechnology" have only existed for 10 to 15 years and given the rather impressive advances toward the understanding of mammalian biology achieved over the short time-frame, speculation of research plans over the next 20 years are, at best, speculative. Indeed one scenario may be that traditional red meat species (beef and swine) will be replaced by more efficient animal protein species (poultry and fish) or alternatively molecular biology will permit the "design" of genetics such that specie distinction would be meaningless (i.e., cattle expressing avian actin and myosin genes resulting in the production of 1000 lb ruminating chickens).

Assumptions regarding animal agriculture in the year 2010:

- More stable global economy and a market environment demanding more value-added commodities and greater global competition.
- US agricultural population will continue to shrink with a corresponding increase of manufacturing technology and service sector population.
- The significance of environmental quality and technology impact on the environment will increase.
- Non-animal protein production efficiency and consumer acceptability will increase.
- Human dietary requirement guidelines will be better understood.
- Consumer awareness and education will improve.
- Consumers will demand more preparation-ready foods.

These assumptions underlie the need within production animal agriculture to improve efficiency and adapt readily to changes in the agricultural economy. With reference to the nutrient partitioning model of animal growth, the understanding of muscle and adipose tissue growth patterns are evolving. But, growth of these tissues represent an environmental adaptation to nutrient supply constrained by genetic capacity. Research thrusts into the control of bone growth, and, even more preferable, the differentiation and growth metabolism of neural tissues, would coordinately increase lean tissue production efficiency.

- **Basic research efforts to characterize and manipulate rate-limiting aspects of animal growth:**

Anabolic- improved methodology to assess protein turnover, understanding of muscle cell and fiber differentiation, exploration of bone mitogens

stimulating muscle growth.

Catabolic- depression of fat cell differentiation, development of autoimmune techniques to regulate extent of fat development, continued efforts to characterize endocrine regulation of fat metabolism.

Product quality- improve human health characteristics of animal fat.

- **Improve nutrient availability to target tissues:**

Expand understanding of gut function and microbial interactions.

Decrease rate of gut tissue turnover.

Target nutrient composition and formulation to composition of gain.

- **Expand transgenic capabilities for biologically and economically important traits:**

Genome mapping and blood group antigen profiles.

Control timing and extent of gene expression.

Develop breeding systems to expand desirable transgenic germplines.

- **Relationship of neural transmitter synthesis to endocrine function/systemic metabolism:**

Influence of nutrient environment on appetite.

Characterization of systemic metabolites on neural transmitter signaling mechanisms.

- **Decrease reliance on exogenous animal health adjuncts and increase use of biological strategies**

As stated these priorities are nebulous and nonexclusive. Current policy emphasis on the production of low-fat/lean meat assists the researcher with respect to scientific focus. Continued succinct policy support as to research goals of animal agriculture is essential.

TRENDS IN ANIMAL PRODUCTION

Genetic Aspects

Constraints and Opportunities:

1. Market requirements:
 - a. Lean meat: Reduce caloric and fat content of red meats
 - b. Quality of meat: Tenderness, juiciness, flavor
2. Feed Resources: Impact economic efficiency
 - a. Reduce costs of grain, forage and pasture
3. Genetic Resources:
 - a. Vast genetic variation exists among and within breeds. Selection between and within breeds can optimize performance for most traits.
 - b. In beef production, no breed excels due to antagonistic genetic relationships (Trade-offs):
 - 1) Bos taurus breeds with the greatest lean growth potential also produce progeny with:
 - a) Increased birth weights and dystocia
 - b) Lower levels of marbling but acceptable tenderness
 - c) Older at puberty if milk production is low
 - d) Heavier mature weight and increased maintenance cost
 - 2) Bos indicus x Bos taurus cross cows excel in calving ease and are exceptionally efficient cows, especially in subtropics; however, advantages tempered by
 - a) Older age at puberty,
 - b) Increased mortality when born in cold-wet conditions
 - c) Reduced meat tenderness.
 - 3) Managing trade-offs:
 - a) New Germ Plasm (e.g., Tropically adapted Bos taurus --- Are tropically adapted Bos taurus breeds like other Bos taurus in meat tenderness or like Bos indicus?)
 - b) Intra population selection (e.g., calving ease, tenderness)
 - c) Crossbreeding systems (Terminal sires, Composites etc.)
 - d) New technology (e.g., sex control, active immunization, gene insertion)

Long Term Implications to Production Sector

1. As in the past, the primary challenge to producers will be to synchronize genetic resources with the climate, feed and other production resources and with market requirements:
2. Provide low cost meat products specifying fat, protein, caloric and other nutrients that satisfy diverse dietary and taste demands of consumers. Pressure to reduce caloric and fat content likely to continue.
3. Diverse feed resources will be used, especially in cow herds. Use of concentrates will continue in growing-finishing diets of ruminants.

4. A broad germ plasm base will be required for meat production. Unlike dairy or egg production, meat production is not likely to be dominated by any one breed or biological type. Diverse breeds will be required to exploit heterosis and complementarity in crossbreeding and to match genetic potential with diverse market requirements and climatic zone-feed resource situations.
5. Use of composite populations are likely to increase to optimize performance levels and facilitate management.
6. Intra-breed selection will continue to play an important role in genetic improvement of cattle. New selection criteria and procedures will emerge to shape breeding practices. Likely prospects are procedures to select for carcass and meat characteristics, twinning and genetic resistance to disease. Genetic prediction procedures may incorporate gene markers.
7. Breeding and production practices will be shaped by new technology (e.g., immuno regulation of growth, gene insertion, and sex control).

Research Priorities in Meat Animals:

1. Identify genetic methods to increase reproductive efficiency (e.g., twinning in cattle, pre- and post-natal survival, litter size, conception rate, etc.)
2. Identify genetic methods to increase resistance to infectious diseases and parasites.
3. Identify genetic methods to increase efficiency of nutrient utilization and output per unit input on a life cycle basis.
4. Identify genetic methods to increase efficiency of lean tissue growth, reduce caloric and fat content of red meat and improve palatability.
5. Identify genetic methods to overcome antagonistic genetic relationships among components of life cycle efficiency (reproductive rate, survival, lean growth efficiency, lactation, feed intake and maintenance) and carcass and meat characteristics.
6. Introduce and evaluate new sources of germ plasm that may improve genetic capacity for adaptation to specific climatic-feed resource situations, alleviate constraints resulting from antagonistic genetic relationships important components of life cycle efficiency and meat products, and provide useful germ plasm for identification, isolation and transfer of genes to improve specific traits in otherwise more adapted and efficient populations.
7. Identify, sequence and map genes associated with bioeconomic traits in livestock.
8. Develop and evaluate genetic prediction procedures using data on individuals, relatives and genetic markers to improve breeding value estimation among and within breeds.

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